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Vegetation Survey of Floodplain Forests in East-Central Illinois

Richard W. Crites
Eastern Illinois University

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Vegetation Survey of Floodplain Forests in East-Central Illinois

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BY

Richard W. Crites

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THESIS

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VEGETATION SURVEY OF FLOODPLAIN FORESTS IN EAST-CENTRAL ILLINOIS

Introduction

The Embarass River, which has its headwaters in Champaign County, flows south through east-central Illinois for 160 miles and finally enters the Wabash River south of Lawrenceville, Illinois. The river drains most of the fertile farm land in this area and usually floods at least once each year in the latter part of May or early June. The flooded conditions usually last no longer than five days. During the latter part of the summer, the river often becomes so low that a person can jump the small stream in many places.

The Embarass River was formed as a result of the Wisconsin Glacier which moved into Illinois about 12,000 years ago (Coleman, 1926) from the northeast and extended southward and westward to a position along a line from Paris through Charleston, Shelbyville, Decatur, and Peoria. The glacial drift, deposited at this position of the ice front, formed a series of ridges called the Shelbyville Moraine that is built up to an elevation of 700 to 750 feet above sea level (Leighton, Eckblaw, and Horberg, 1948). The proposed dam site of the Lincoln Reservoir is located near the southern edge of this moraine, and the reservoir would occupy the channel cut by the Embarass River through this moraine and the ground moraine to the north.

The topography of the Shelbyville Moraine in the vicinity of the proposed reservoir is extremely rugged. Numerous small streams enter the steep-walled valley cut by the Embarass River. Most of these streams are less than two miles from headwater to mouth and flow rapidly down extreme gradients (50-70 feet per mile). Four major tributaries (Indian Creek, Kickapoo Creek, Whetstone Creek, and Polecat Creek) enter the Embarass River in the Shelbyville Moraine. These streams are found between the major east-west ridges of the moraine and each has numerous small valleys leading into them. No large or undisturbed floodplain forests are found along these tributaries. Except for near the Embarass River, these smaller valleys are too narrow and their gradients too steep for the prolonged flooding necessary for the development of floodplain forests.

In the Charleston area, the average yearly precipitation is 38.57 inches. The mean daily maximum temperature per year is 64.3°F and the mean daily minimum temperature per year is 42.5°F (Climatography of the United States No. 86-9). According to the Köppen system of classification of climates (Köppen and Geiger, 1930), the Charleston climate would be Dfa type (D=temperature of coldest month is under 32°F; warmest month is over 50°F: f=no dry season; driest month of summer receives 1.2 inches of precipitation: a=warmest month is over 71.6°F).

Vestal (1931) and Braun (1950) regard the upland forests in this area as the Oak-Hickory climax. Braun then states the forests

of low terraces and well drained bottomlands are composed of a mixture of mesophytic slope forest species and floodplain species with others such as walnut, ash, elm, Kentucky coffee tree, hackberry, bur-oak, and honey locust. In low floodplain communities, silver maple, white elm and cottonwood are most abundant.

At one time, the lowland areas along the Embarass River were covered with floodplain forests. Presently, most of this area has been cleared for agricultural purposes. The few forest areas that remain have been subjected to some cutting and grazing. Since most of this forest type will be inundated by the proposed Lincoln Reservoir, this study was undertaken to determine the forest composition before it was destroyed.

Location of Woodlots Investigated

In this survey the floodplain, referred to as "first bottoms" by Putnam (1951), was considered to be that area of the bottomland which is associated with the present river channel and which normally floods when the river overflows. In each area, a hillside or a terrace formed by an earlier channel served as the limit of the floodplain. In most areas, a natural levee was located just back from the river's edge. Except for small depressions or occassionally an old channel or levee, the areas were relatively flat, seldom varying more than five feet in elevation. All areas were approximately fifteen feet above the present river bed.

Only those areas considered large enough for study and

representing relatively mature woodlots were used in this survey. The areas ranged from 0.93 to 3.55 acres, with a total of 13.75 acres surveyed. These areas were:

Area 1. Area one was located on the west side of the river in the SE/¼ SE/¼ of Section 22, T11N, R9E, Coles County, Illinois. This was the largest area surveyed, 3.55 acres, with a variation in elevation of 3.5 feet. This area appeared to be the most mature area studied.

Area 2. Area two was also located on the west side of the river in the SW/¼ SE/¼ of Section 27, T11N, R9E, Cumberland County, Illinois. This area includes 2.32 acres with a variation in elevation of 7.5 feet.

Area 3. Area three was located on the east side of the river in the NE/¼ NE/¼ of Section 23, T11N, R9E, Coles County, Illinois. This area includes 2.32 acres with a variation in elevation of 5 feet.

Area 4. Area four was located within a meander of the river in the SE/¼ NW/¼ of Section 23, T11N, R9E, Coles County, Illinois. This area includes 3.09 acres with a variation in elevation of 5 feet.

Area 5. Area five was located on the east side of the river in the NW/¼ SW/¼ of Section 13, T11N, R9E, Coles County, Illinois. This area includes 1.54 acres with a variation in elevation of 5.6 feet. Areas five and six appeared to be the youngest of the forests studied.

Area 6. Area six was located within a meander of the river in the NW/¼ SE/¼ of Section 14, T11N, R9E, Coles County, Illinois. This was the smallest area surveyed, 0.93 acres, with a variation in elevation of 3.8 feet.

Method of Study

Each of the six areas studied was divided into 25-meter square quadrats (0.154 acre or 0.0625 hectare) and the number, size, and species of trees were recorded in each. The diameter of all trees with a d.b.h. of more than four inches was recorded to the nearest 1/10 inch. Dead-standing trees were also measured and identified when possible. Dead-down trees were not recorded as they could have easily been carried into the areas by the frequent floods of the Embarass River. The Importance Value Index (IVI) was then calculated from the actual data to provide a better basis of comparison of the various species and areas. The IVI, as used here, follows the procedure outlined by McIntosh (1957), in which the IVI is the sum of the following:

relative density

$$\frac{\text{number of individuals of a species}}{\text{number of individuals of all species}} \times 100 ,$$

relative dominance

$$\frac{\text{basal area of a species}}{\text{basal area of all species}} \times 100 ,$$

and the relative frequency

$$\frac{\text{number of plots of occurence of a species}}{\text{total plots of occurence of all species}} \times 100 .$$

Due to the low frequency of saplings, seedlings and shrubs (1-10 per plot), their abundance and occurence in the floodplain forests studied was noted by walking through the woodlots and observing which ones were present. Also, the topography and overstory where they were growing was recorded.

All herbaceous species found in the areas studied were identified and their abundance recorded. Collections and observations were made in May, July, and September. The abundance of each species was determined by a modification of the procedure outlined by Acocks (1953). A mean distance was determined after a series of measurements was made between individuals of the same species and the abundance was determined by using the following scale:

Average distance between plants	abundance category
3 in. - 1 ft.	abundant
1 ft. - 3 ft.	common
3 ft. - 12 ft.	frequent
12 ft. - 50 ft.	occasional
>50 ft.	rare

Voucher specimens of all specimens have been deposited in the Eastern Illinois University Herbarium. The taxonomic nomenclature used in this paper follows that of Jones (1963).

Results and Discussion

Twelve species of trees were found in the six floodplain forests studied. Of these, Acer saccharinum, Populus deltoides

and Acer negundo were extremely important and in most instances had an IVI above 50. Salix nigra, Ulmus rubra, Platanus occidentalis and Fraxinus americana were also relatively important in these forests with their IVI's sometimes exceeding 20 but rarely 40. These seven species with their relative values, number of individuals per acre, and basal area per acre in diameter classes for the six areas studied are included in Tables 1 through 6. The remaining species (Aesculus glabra, Morus rubra, Celtis occidentalis, Gleditsia triacanthos and Juglans nigra) were rarely encountered and had extremely low IVI's. This latter group of species comprises the "others" in the Tables.

Of the arborescent species found in the floodplain forests, Acer saccharinum has the highest IVI in all areas studied except Area five. It was found in nearly every quadrat examined and in most areas has the highest relative frequency and relative density. This species is well represented in all diameter classes, but is sometimes exceeded by Populus deltoides in the larger classes. In Area 5 (Table 5), Acer negundo exceeds Acer saccharinum in the number of individuals per acre in the 4-6 inch diameter class. A few saplings and seedlings of Acer saccharinum were found in the floodplain forests. Seedlings were very common at the edge of the forests near the river and some saplings were observed on the higher parts of the floodplain and in small openings in the forest.

The number of small diameter trees, as well as the presence of saplings indicates this species will continue to be an important stand component of the floodplain forests.

Populus deltoides ranks second in IVI in most of the areas studied, mainly because of its high relative dominance. It ranks well below Acer saccharinum in relative density, but was well scattered throughout the forests, as indicated by its high relative frequency. This species ranks first in IVI only in area 5 (Table 5). The largest trees found in the survey were Populus deltoides, and this species usually had the most individuals and the highest basal area per acre in the 13-24 inch and the 25+ inch diameter classes. No saplings or seedlings of this species were found in the areas studied, although seedlings are common nearby in open fields and at the edge of the river. Due to this lack of reproduction and the few individuals in the lower diameter classes, this species will become less important as these forests become more mature.

Acer negundo is third in IVI in Areas 1,2,4 and 6 due mainly to its high relative frequency. It ranks second in IVI in Areas 3 and 5 because of the large number of individuals in the lower diameter classes. This species is much more common than Populus deltoides in the 4-6 inch diameter class in all areas studied. No trees of this species were found with a diameter greater than

18 inches. Saplings and seedlings of Acer negundo were more common than those of any other species and were well scattered throughout most of the forests. Since this species is able to reproduce in the floodplain forests, indicating some degree of shade tolerance, it will probably continue to be relatively important. However, it usually does not attain the size of Acer saccharinum and Populus deltoides, and its importance will not increase greatly.

Salix nigra is fourth in IVI in Areas 1, 2, and 4, and fifth or lower in the others. This species is usually restricted to the lower parts of the floodplain. Often the individuals are clumped and in straight rows, suggesting the river channel was near these areas at one time, and has since changed its course. No seedlings or saplings of this species were found in the forests, but some were found near the river's edge, particularly on sandbars and in association with Salix interior. This species will probably die out except near the river's edge.

Ulmus rubra ranks fourth in IVI in Areas 3, 5 and 6 and fifth in the remaining areas, due chiefly to its high relative frequency. No trees were found with a diameter greater than 12 inches in five of the areas, and most individuals were in the 4-6 inch diameter class. Saplings were more restricted, however, occurring on natural levees and toward the back of the floodplain near a terrace or hillside where there was less chance of prolonged flooding.

Platanus occidentalis and Fraxinus americana are found in some

of the areas and usually rank sixth and seventh in IVI. These species are commonly associated with terraced and drier areas and usually do not occur in large number in the typical floodplain forest (Braun, 1950).

The remaining species were scattered and not very abundant. In most cases, these were found near the terrace or hillside limiting the back of the floodplain and in higher areas where it is slightly drier and there is less chance of prolonged flooding. These species are more characteristic of small creeks where flooding is not a common occurence.

A total of 215 dead-standing individuals were found with a total basal area of 69.62 square feet. Of these, 22 were Acer negundo with a total basal area of 4.08 square feet; 83 were Acer saccharinum with a total basal area of 24.78 square feet; 52 were Populus deltoides with a total basal area of 13.52 square feet and 49 were Salix nigra with a total basal area of 23.27 square feet. Also, two large stumps of Acer saccharinum and three of Populus deltoides were found in Area 2. These were included in the dead-standing totals. Most of the dead individuals were scattered throughout the floodplain forests. However, dead-standing individuals of Salix nigra showed definite clumping, usually associated with old river channels.

The species with the most seedlings and saplings were Acer negundo, Ulmus rubra, Ulmus americana, Celtis occidentalis,

Acer saccharinum, and Fraxinus americana, in that order of abundance. These were especially common in higher areas and on the natural levees. In open areas of the forest, heavy populations of Acer negundo saplings were observed. Extensive populations of Acer saccharinum seedlings were occasionally found on recent sandbars along the east bank of the river.

Saplings and seedlings of Morus rubra, Quercus muhlenbergii, Quercus rubra, and Juglans nigra were rarely found in the floodplain forests studied. However, with the exception of Morus rubra, these species were still in the seedling stage. There were four Morus rubra saplings found, all growing on elevated areas of the floodplain. These species will probably have little effect on the future composition of the forest until the sites become drier.

Some shrubs and vines were found in the floodplain forests. These included Sambucus canadensis, Rhus radicans, Salix interior, Campsis radicans, Parthenocissus quinquefolia, and Vitis aestivalis. As with the tree saplings and seedlings, some of the shrubs and vines were localized in their distribution. Sambucus canadensis and Campsis radicans were found mostly on scattered elevated areas and on the natural levees near the river. These areas were usually three to five feet higher than the normal floodplain. Salix interior, however, was found only in sandbar areas near the river's edge and in full sunlight with an extensive growth resulting from "root shoots".

By far, the most abundant herbaceous species was Laportea canadensis. This species grew in all parts of the floodplain forests studied. Impatiens biflora, Viola papilionacea, Cryptotaenia canadensis, and Polygonum virginianum were also frequently encountered, but not as often as Laportea. The distribution of most of the species seems to be dependent upon the moisture in the area and the amount of sunlight which penetrates the overstory. A complete listing of the herbaceous vascular plants with their distribution and abundance is included in an annotated checklist at the end of this paper.

The results obtained in this study compare favorably with the descriptions of a floodplain forest as described by Braun (1950) except for white elm (Ulmus americana). This species was not a significant component of the floodplain forests studied. However, red elm (Ulmus rubra) was important and ranked as high as fourth in IVI. The absence of white elm was probably due to phloem necrosis and Dutch Elm disease which killed many of the elm trees about twenty years ago.

The floodplain forests studied are considered Mixed Soft-hardwood according to Hosner and Minckler (1963) . In their successional studies of this type of floodplain forest in Southern Illinois, Salix nigra, Salix interior and Populus deltoides represent the pioneer species. Soon Platanus occidentalis, Acer saccharinum, and Acer negundo seedlings appear, but since these species grow slower, they are

pole-sized or smaller as Salix nigra and Populus deltoides approach biological maturity. They further state that the frequency of Acer negundo and Acer saccharinum suggests that the next stand will consist predominantly of these two species. The results obtained in the present study suggest that these forests are progressing toward the Acer saccharinum-Acer negundo stage, and that Salix nigra and Populus deltoides will become less important. This is indicated by the large number of dead-standing individuals of Salix nigra, the small number of lower diameter individuals of Populus deltoides, and the lack of seedlings and saplings of both species in the forested areas.

Summary

Woody and herbaceous vegetation surveys were made of six areas (13.75 acres) located in the Embarass River floodplain in east-central Illinois. The objectives were to determine the present composition and the future trend of the floodplain forest and to obtain a record of their present composition before they are destroyed by the proposed Lincoln Reservoir.

Acer saccharinum, Populus deltoides, Acer negundo, and Salix nigra were found to be the most important in the floodplain forest composition. Reproduction in the areas indicate that Acer negundo and Acer saccharinum will continue to be of major importance. However, there was no Populus deltoides reproduction and Salix nigra

was only able to reproduce in wet areas near the river's edge. Observations indicate that these floodplain forests are becoming drier since Celtis occidentalis, Ulmus rubra, Ulmus americana, and Fraxinus americana are beginning to invade these areas. In the future, as runoff and flooding are controlled, these species will probably become important in the floodplain forest composition.

Annotated Checklist of Vascular Herbaceous Plants of the Embarass Floodplain Forests With Their Occurrence and General Distribution.

The total number of herbaceous taxa of vascular plants recorded from the Embarass Floodplain forest areas is 27. None of these were fern or fern-allies, while 6 are monocots and 21 are dicots.

In the following list, the nomenclature follows that of Jones (1963). In this list, each species is followed by its general distribution and occurrence in the areas studied.

Araceae

Arisaema dracontium (L.) Schott - Few individuals in all areas: rare.

Balsaminaceae

Impatiens biflora Walt. - Found throughout the floodplain forests: frequently to locally common.

Impatiens pallida Nutt. - Found throughout the floodplain forests: frequently to locally common.

Campanulaceae

Campanula americana L. - Found on open terrace areas: rare.

Compositae

Ambrosia trifida L. - Found only in Area two: locally common.

Aster pilosus Willd. - Found mostly in Areas five and six: occasional.

Eupatorium coelestinum L. - Seldom found in the flood-plain forests: rare.

Eupatorium rugosum Houtt. - Seldom found in flood-plain forests: rare.

Rudbeckia laciniata L. - Found in all areas: locally frequent.

Cruciferae

Iodanthus pinnatifides (Michx.) Steud. - Individuals found only in Areas two and three: rare.

Cyperaceae

Carex grayii Carey - In low areas: rare.

Graminae

Elymus villosus Muhl. - In shaded areas: frequent.

Elymus virginicus L. - In open areas: locally frequent.

Glyceria striata (Lam.) Hitchc. - In low areas: rare.

Leersia virginica Willd. - In moist open areas: locally abundant.

Liliaceae

Smilax lasioneura Hook. - On terraced areas: rare.

Polemoniaceae

Phlox paniculata L. - In open parts of Area six: locally frequent.

Polygonaceae

Polygonum virginianum L. - Found in higher parts near back of areas studied: locally abundant.

Rumex verticillatus L. - Only 4 individuals found: rare.

Ranunculaceae

Delphinium tricorne Michx. - In heavily shaded areas: rare.

Ranunculus abortivus L. - Found in all areas surveyed: rare.

Ranunculus septentrionalis Poir. - Found in all areas surveyed: rare.

Rosaceae

Geum canadensis Jacq. - Found only in area five near back edge: rare.

Umbelliferae

Cryptotaenia canadensis (L.) DC. - Found in all areas: common.

Sanicula gregaria Bickn. - Throughout the floodplain area: occasional.

Urticaceae

Laportea canadensis (L.) Gaud. - In all areas of the floodplain: abundant.

Pilea pumila (L.) A. Gray. - More often in wet areas: frequent.

Urtica gracilis Ait. - Found near back limit of Area five: rare.

Violaceae

Viola papilionacea Pursh. - In all areas of floodplain: common.

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Table 1.—Number of Trees and Basal Area Per Acre and Relative Values For the Woody Vegetation of Area One Located Five Miles South of Charleston, Illinois.

Species	Number of Trees and Basal Area Per Acre by Diameter Class										Relative Values			
	4-6		7-12		13-24		25+		Total					
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.I.
Acer saccharinum	70.4	11.7	76.1	37.6	23.1	34.8	0.6	2.4	170.2	86.5	26.1	62.4	50.7	139.2
Populus deltoides	6.2	1.1	22.0	12.1	22.0	38.5	3.4	14.5	53.6	66.2	23.8	19.6	38.8	82.2
Acer negundo	12.1	1.9	7.0	2.5	1.7	1.9	...	...	20.8	6.3	22.7	7.6	4.3	34.6
Salix nigra	15.2	2.3	3.7	1.6	2.0	2.5	...	...	20.9	6.4	9.0	7.6	3.7	20.3
Ulmus rubra	2.5	0.3	0.3	0.2	...	...	...	...	2.8	0.5	6.8	1.0	0.3	8.1
Platanus occidentalis	0.3	0.1	0.3	0.2	0.8	2.5	...	...	1.4	2.8	4.5	0.5	1.6	6.6
Fraxinus americana	2.2	0.4	0.3	0.1	...	...	...	...	2.5	0.5	4.5	0.9	0.2	5.6
Others	0.6	0.1	...	...	...	...	...	...	0.6	0.1	2.6	0.4	0.4	3.4
Totals	109.5	17.9	109.7	54.3	49.6	80.2	4.0	16.9	272.8	169.3	100.0	100.0	100.0	300.0

Table 2.—Number of Trees and Basal Area Per Acre and Relative Values For the Woody Vegetation of Area Two Located Six Miles South of Charleston, Illinois.

Species	Number of Trees and Basal Area Per Acre by Diameter Class										Relative Values			
	4-6		7-12		13-24		25+		Total					
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.I.
Acer saccharinum	55.2	9.2	94.8	48.0	21.6	27.2	...	...	171.6	84.4	32.6	76.0	60.7	169.3
Populus deltoides	2.6	0.4	7.3	4.4	21.6	37.9	...	...	31.5	42.7	26.0	13.9	30.7	70.6
Acer negundo	6.0	1.0	5.6	2.6	1.3	1.8	...	....	12.9	5.4	19.5	5.7	3.9	29.1
Salix nigra	0.4	...	4.7	3.2	2.6	2.6	...	...	7.7	5.8	13.0	3.4	4.1	20.5
Ulmus rubra	0.4	0.1	0.4	0.2	...	...	...	...	0.8	0.3	4.3	0.3	0.1	4.7
Platanus occidentalis	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fraxinus americana	...	...	0.4	0.2	...	...	...	...	0.4	0.2	2.1	0.1	0.1	2.3
Others	0.4	...	0.4	0.2	...	.....	...	...	0.8	0.2	2.5	0.6	0.4	3.5
Totals	65.0	10.7	113.6	58.8	47.1	69.5	...	...	225.7	139.0	100.0	100.0	100.0	300.0

Table 3.—Number of Trees and Basal Area Per Acre and Relative Values For the Woody Vegetation of Area Three Located Eight Miles South of Charleston, Illinois.

Species	Number of Trees and Basal Area Per Acre by Diameter Class										Relative Values			
	4-6		7-12		13-24		25+		Total					
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.I.
Acer saccharinum	45.7	7.2	51.7	26.6	29.7	43.5	...	....	127.1	77.3	28.3	56.5	49.4	134.2
Populus deltoides	....	...	3.4	2.0	21.1	37.0	1.7	8.0	26.2	47.0	18.8	11.6	30.0	60.4
Acer negundo	17.7	3.0	34.9	17.9	3.4	3.9	...	...	56.0	24.8	24.5	24.9	15.8	65.2
Salix nigra	0.9	0.2	1.7	0.9	3.0	4.3	...	...	5.6	5.4	7.5	2.4	3.3	13.2
Ulmus rubra	7.3	1.1	0.9	0.3	...	...	...	...	8.2	1.4	15.0	3.6	0.8	19.4
Platanus occidentalis	...	....	0.4	0.2	...	...	...	...	0.4	0.2	1.8	0.1	0.1	2.0
Fraxinus americana	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Others	0.4	...	0.9	0.4	...	...	...	...	1.3	0.4	4.1	0.9	0.6	5.6
Totals	72.0	11.5	93.9	48.3	57.2	88.7	1.7	8.0	224.8	156.5	100.0	100.0	100.0	300.0

Table 4.—Number of Trees and Basal Area Per Acre and Relative Values For the Woody Vegetation of Area Four Located Ten Miles South of Charleston, Illinois.

Species	Number of Trees and Basal Area Per Acre by Diameter Class										Relative Values			
	4-6		7-12		13-24		25+		Total					
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.I.
Acer saccharinum	58.9	9.8	53.4	26.4	9.4	12.1	...	...	121.7	48.3	28.1	50.0	37.6	115.7
Populus deltoides	6.2	1.2	22.6	13.0	27.2	45.4	...	...	56.0	59.6	25.3	23.0	46.3	94.6
Acer negundo	20.1	2.9	5.8	2.8	0.6	0.9	...	...	26.5	6.6	25.3	10.9	5.1	41.3
Salix nigra	20.1	3.0	13.9	7.5	2.6	3.2	...	...	36.6	13.7	14.0	15.1	10.6	39.7
Ulmus rubra	1.3	0.2	0.3	0.1	...	...	...	...	1.6	0.3	4.2	0.6	0.2	5.0
Platanus occidentalis	...	...	...	...	...	...	...	...	...	...	...	...	...	....
Fraxinus americana	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Others	0.6	0.1	...	...	...	...	...	...	0.6	0.1	3.1	0.4	0.2	3.7
Totals	107.2	17.2	96.0	49.8	39.8	61.6	...	...	243.0	128.6	100.0	100.0	100.0	300.0

Table 5.—Number of Trees and Basal Area Per Acre a d Relative Values For the Woody Vegetation of Area Five Located Eight Miles South of Charleston, Illinois.

Species	Number of Trees and Basal Area Per Acre by Diameter Class										Relative Values			
	4-6		7-12		13-24		25+		Total					
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.I.
Acer saccharinum	9.1	1.5	26.0	13.1	11.7	17.4	3.2	16.6	50.0	48.6	14.8	20.0	28.1	62.9
Populus deltoides	3.9	0.8	39.0	22.4	29.9	45.4	3.2	17.1	76.0	85.7	21.2	30.3	49.6	101.1
Acer negundo	76.6	11.8	18.8	7.0	3.2	4.6	...	...	98.6	23.4	21.2	39.4	13.5	74.1
Salix nigra	5.8	0.7	0.6	0.2	...	...	...	...	6.4	0.9	6.3	2.5	0.5	9.3
Ulmus rubra	3.2	0.5	2.0	0.8	0.6	0.8	0.6	2.8	6.4	4.9	8.5	2.5	2.8	13.8
Platanus occidentalis	0.6	0.1	0.6	0.2	1.3	3.6	...	...	2.5	3.9	8.5	1.0	2.2	11.7
Fraxinus americana	0.6	0.1	1.3	0.4	...	...	...	...	1.9	0.5	2.1	0.7	0.2	3.0
Others	3.9	0.8	1.3	0.7	2.6	3.2	...	...	7.8	4.7	17.4	3.6	3.1	24.1
Totals	103.7	16.3	89.6	44.8	49.3	75.0	7.0	36.5	249.6	172.6	100.0	100.0	100.0	300.0

Table 6.—Number of Trees and Basal Area Per Acre and Relative Values For the Woody Vegetation of Area Six Located Eight Miles South of Charleston, Illinois.

Species	Number of Trees and Basal Area Per Acre by Diameter Class										Relative Values			
	4-6		7-12		13-24		25+		Total					
	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	No.	B.A.	Rel. Freq.	Rel. Den.	Rel. Dom.	I.V.I.
Acer saccharinum	49.5	7.5	62.4	30.6	37.6	60.2	2.2	9.5	151.7	107.8	28.5	55.0	51.1	134.6
Populus deltoides	3.2	0.7	20.4	11.3	28.0	38.6	4.3	17.0	55.9	67.6	14.2	20.3	32.1	66.6
Acer negundo	22.6	3.8	18.3	7.9	8.6	9.8	...	...	49.5	21.5	28.5	17.9	10.1	56.5
Salix nigra	....	...	...	...	...	...	...	...	...	...	....	...	...	...
Ulmus rubra	7.5	1.2	3.2	1.2	...	...	...	...	10.7	2.4	14.2	3.9	1.1	19.2
Platanus occidentalis	...	...	...	...	...	...	2.2	8.6	2.2	8.6	4.7	0.7	4.0	9.4
Fraxinus americana	1.1	0.2	2.2	1.0	1.1	1.2	...	...	4.4	2.4	4.7	1.5	1.1	7.3
Others	...	...	1.1	0.4	...	...	...	...	1.1	0.4	5.2	0.7	0.5	6.4
Totals	83.9	13.4	107.6	52.4	75.3	109.8	8.7	35.1	275.5	210.7	100.0	100.0	100.0	300.0